

What Is Claimed:

1. A paper product having improved strength properties comprising:
a fibrous web containing cellulosic fibers, said fibrous web
- 5 including a combination of a polyvinylamine polymer and a polymeric anionic reactive compound.
2. A paper product as defined in claim 1, wherein said polyvinylamine polymer and said polymeric anionic reactive compound form a polyelectrolyte complex.
- 10 3. A paper product as defined in claim 1, wherein said polymeric anionic reactive compound comprises an anionic polymer containing carboxylic acid groups or salts thereof.
4. A paper product as defined in claim 1, wherein said polymeric anionic reactive compound comprises an anionic polymer
- 15 containing anhydride groups or salts thereof.
5. A paper product as defined in claim 1, wherein said polymeric anionic reactive compound comprises a polymer of a maleic anhydride or a maleic acid.
6. A paper product as defined in claim 1, wherein said
- 20 polymeric anionic reactive compound comprises a poly-1,2-diacid.
7. A paper product as defined in claim 1, wherein said polyvinylamine polymer and said polymeric anionic reactive compound are each added to the fibrous web in an amount from about 0.1% to about 6% by weight of the fibrous web.
- 25 8. A paper product as defined in claim 1, wherein said polyvinylamine polymer comprises a partially hydrolyzed polyvinylformamide.
9. A paper product as defined in claim 8, wherein from about 50% to about 90% of said polyvinylformamide is hydrolyzed.

10. A paper product as defined in claim 1, wherein said polyvinylamine polymer is applied to the surface of said fibrous web.

11. A paper product as defined in claim 10, wherein said polyvinylamine polymer is applied to the surface of the web in a pattern.

5 12. A paper product as defined in claim 1, wherein said polyvinylamine polymer is incorporated into the fibrous web during formation of the web.

13. A paper product as defined in claim 1, wherein the web has a 25- μ l Pipette Intake Time greater than 30 seconds.

10 14. A paper product as defined in claim 1, wherein the web has a 25- μ l Pipette Intake Time greater than 60 seconds.

15. A paper product as defined in claim 1, wherein the web has a Water Drop Intake Time greater than 30 seconds.

16. A paper product as defined in claim 1, wherein the web has a Water Drop Intake Time greater than 60 seconds.

15 17. A paper product having improved strength properties comprising:

a fibrous web containing cellulosic fibers, said fibrous web further comprising a combination of a polyvinylamine polymer and a
20 complexing agent, said complexing agent comprising a material selected from the group consisting of a polymeric aldehyde functional compound and an anionic surfactant, said polyvinylamine polymer and said complexing agent forming a polyelectrolyte complex.

18. A paper product as defined in claim 17, wherein said
25 complexing agent comprises a polymeric aldehyde functional compound, and wherein said polymeric functional compound comprises an aldehyde cellulose.

19. A paper product as defined in claim 17, wherein said

complexing agent comprises a polymeric aldehyde functional compound,
and wherein said polymeric functional compound comprises an aldehyde
functional polysaccharide.

20. A paper product as defined in claim 17, wherein said
5 complexing agent comprises a glyoxylated polyacrylamide.

21. A paper product as defined in claim 17, wherein said
polyvinylamine is present in said fibrous web in an amount from about
0.1% to about 6% by weight based upon the weight of the web.

22. A paper product as defined in claim 17, wherein said
10 polyvinylamine polymer comprises a partially hydrolyzed
polyvinylformamide.

23. A paper product as defined in claim 22, wherein from about
50% to about 90% of said polyvinylformamide is hydrolyzed.

24. A paper product as defined in claim 17, wherein said
15 complexing agent is present in an amount from about 0.1% to about 2%
by weight based upon the weight of the web.

25. A paper product as defined in claim 17, wherein said
polyvinylamine polymer and said complexing agent were added to an
aqueous fibrous suspension that was used to form said fibrous web.

20 26. A paper product as defined in claim 17, wherein said
complexing agent comprises a polymeric aldehyde functional compound,
and wherein said polymeric aldehyde functional compound comprises a
temporary wet strength agent.

27. A method for improving the strength properties of a
25 paper product comprising the steps of:

providing a fibrous web containing pulp fibers;

adding to the fibrous web a polyvinylamine and a

complexing agent, wherein the complexing agent is a material selected

from the group consisting of a polymeric anionic reactive compound, a

30 polymeric aldehyde functional compound, and mixtures thereof.

28. A process as defined in claim 27, wherein said polyvinylamine and said complexing agent form a polyelectrolyte complex.

29. A method as defined in claim 27, wherein said complexing
5 agent comprises a polymeric anionic reactive compound.

30. A method as defined in claim 29, wherein said complexing agent comprises a polymer of maleic anhydride or maleic acid.

31. A method as defined in claim 29, wherein said complexing agent comprises poly-1,2-diacid.

10 32. A method as defined in claim 27, wherein said polyvinylamine is combined with said fibrous web in an amount from about 0.1% to about 6% by weight.

33. A method as defined in claim 27, wherein said polyvinylamine comprises a partially hydrolyzed polyvinylformamide.

15 34. A method as defined in claim 27, wherein said complexing agent comprises a glyoxylated polyacrylamide.

35. A method as defined in claim 27, wherein said complexing agent comprises a polymeric aldehyde functional compound, said polymeric aldehyde functional compound comprising an aldehyde
20 cellulose or an aldehyde functional polysaccharide.

36. A method as defined in claim 27, further comprising the step of forming said fibrous web from an aqueous suspension of fibers, said polyvinylamine and said complexing agent being added to said aqueous suspension during formation of said fibrous web.

25 37. A method as defined in claim 27, further comprising the step of forming said fibrous web from an aqueous suspension of fibers, said complexing agent being added to said aqueous suspension of fibers during formation of said web, said polyvinylamine being added to said fibrous web after said complexing agent has been added to said
30 aqueous suspension of fibers.

38. A method as defined in claim 27, wherein said polyvinylamine is added to said fibrous web by being applied to a surface of said web.

39. A method as defined in claim 38, wherein said polyvinylamine is applied to the surface of the web in a pattern.

40. A method as defined in claim 27, wherein said polyvinylamine and said complexing agent are added to said fibrous web in an amount sufficient for said fibrous web to have a wet:dry tensile ratio of at least 8%.

41. A method as defined in claim 27, wherein said polyvinylamine and said complexing agent are combined with said fibrous web in the presence of a catalyst and wherein said fibrous web is heated to a temperature of at least 120°C after said polyvinylamine and said complexing agent have been combined with said web.

42. A method as defined in claim 27, wherein said polyvinylamine and said complexing agent are added to said fibrous web in an amount sufficient to produce a substantially hydrophobic web.

43. A method as defined in claim 27, wherein said polyvinylamine is added to said fibrous web prior to said complexing agent.

44. A method as defined in claim 27, wherein said paper product comprises a tissue.

45. A method as defined in claim 27, wherein said paper product comprises a wiper.

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